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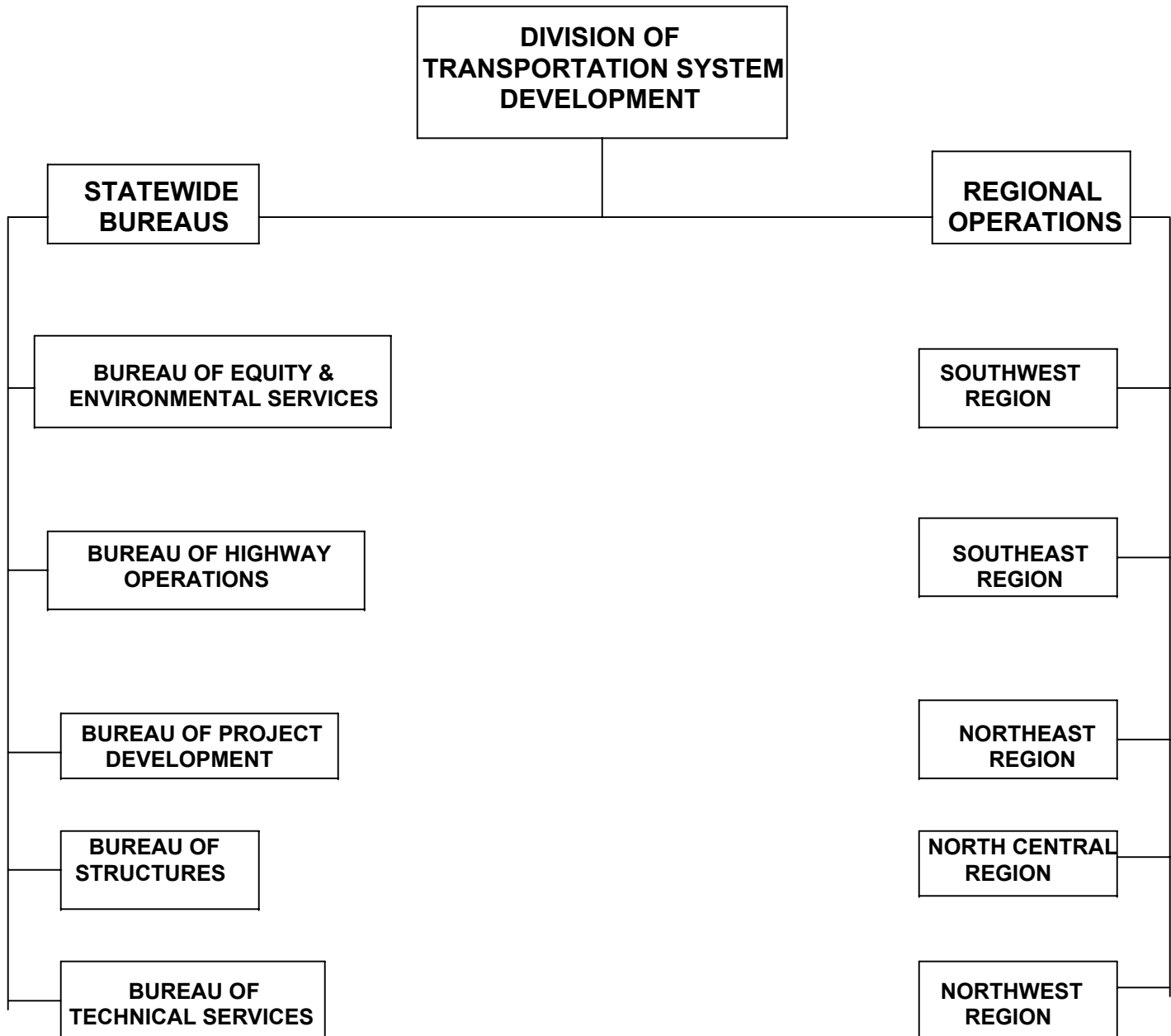
2.1 ORGANIZATIONAL CHARTS

FIGURE 2.1 DIVISION OF TRANSPORTATION SYSTEM DEVELOPMENT

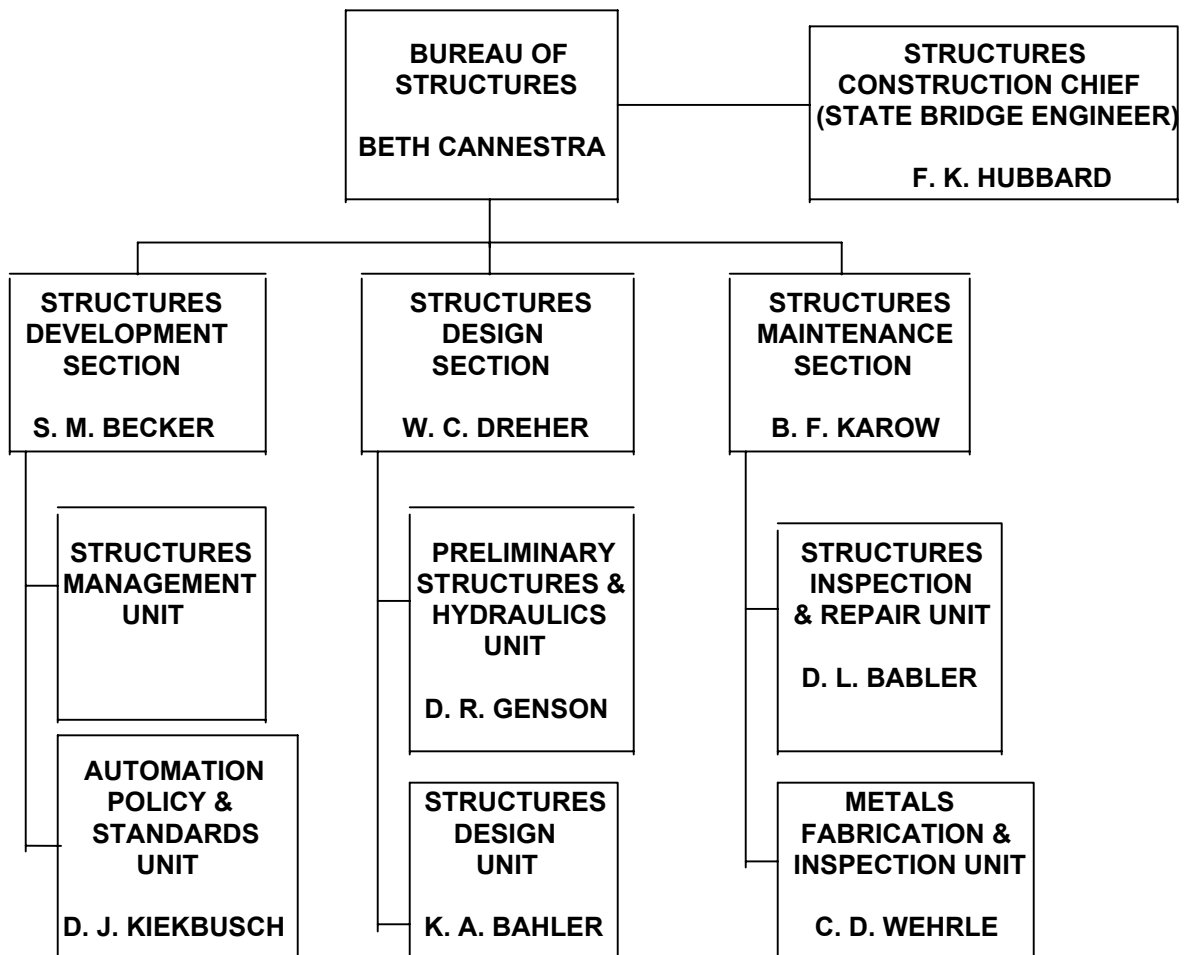


FIGURE 2.2 BUREAU OF STRUCTURES

2.2 CRISIS MANAGEMENT

The procedures to be followed in Crisis Management are for the following incidents.

- A. Bridge Incidents
- B. Major bridge failures

(1) Bridge Incidents

For Bridge Incidents such as vehicle hits on girders, column or railing that are not likely to cause a bridge failure, incident management will be handled by the Regional Office and Structures Maintenance Section. Assistance will be provided by the Structures Design Section if rehabilitation plans are required. Refer to the contacts list for names and telephone numbers.

(2) Major Bridge Failures

A bridge failure is a crisis that requires emergency action on the part of the DOT to protect the safety of other drivers and to prevent additional crashes, to establish appropriate traffic detours, to assess the damage, to determine its cause, to plan and implement its repair. Examples of this crisis include a bridge that collapses as the result of flooding, being struck by a motor vehicle, or the weakening of its members.

Communications in the event of a bridge failure or damage should be directed at assuring the public that the DOT is taking appropriate action to care for victims, protecting other drivers, providing adequate alternate routes, investigating the cause and making repairs in a timely manner.

DOT's first communications with the media – by news release, interview or other verbal contact – should cover, to the extent that it can be confirmed, 1) details of the incident, 2) acknowledgement of deaths or injuries, if any (law enforcement would identify victims when next of kin have been notified), 3) traffic detour, 4) and plan for investigation.

In subsequent news releases or interviews, explain details of the investigation into the cause of the incident and DOT's plans to repair or rebuild the bridge. Supplementary materials may require: 1) maps locating the bridge, closed highways and alternate routes, 2) background information on the bridge's design, construction and past repairs, 3) recent bridge inspection reports, 4) policies regarding bridge inspection.

When an incident takes place, law enforcement will close the highway to traffic. County highway officials will erect barricades and begin detouring traffic.

The State Patrol will contact the Regional Office who in turn should contact the

Bureau of Structures. While the Regional Office will probably retain overall control of the incident, the Bureau of Structures representative should be given shared responsibility.

The hierarchy person who is available on the list is empowered to take charge until another person is available. They should stay in charge until the incident has stabilized before transferring authority. In the case of sign structures, first contact should be made with Kent Bahler (listed below).

A. Structures Maintenance Chief - Bruce Karow

Office: 608-266-3722
Home: 608-831-6122
Mobile: 608-516-6377

B. Structures Construction Chief – Finn Hubbard

Office: 608-266-8489
Home: 608-836-6672
Mobile: 608-516-3563

C. Structures Design Chief – Bill Dreher

Office: 608-261-8205
Home: 608-845-7267

D. Unit Supervisor, Structures Maintenance Section - Dave Babler

Office: 608-266-8195
Home: 608-836-3941
Mobile: 608-516-6376

E. Structures Development Chief – Scot Becker

Office: 608-266-5161
Home: 608-824-0095

F. Unit Supervisors & Team Leaders

Structures Design, Development & Maintenance Sections

Kent Bahler

Office: 608-266-8490
Home: 608-221-4832

Dave Genson

Office: 608-266-8491
Home: 608-274-4059
Mobile: 608-235-0825

Dave Kiekbusch

Office: 608-266-5084
Home: 608-276-9451

Craig Wehrle

Office: 608-266-8487
Home: 608-238-5630

(3) Bureau of Structures Actions in Incident Response

- | A. Document details from Regional Office at time of contact.
- B. Notify Bureau Director, Division Administrator, Secretary's Office & all Bureau coworkers via PCR (Public Communication Record).
- C. Respond to the bridge site if requested.
 - (1) Determine In-house expertise for Project team.
 - (2) Determine if Consultant expertise is needed.
 - (3) Involve all available Bureau Sections in decision making.
 - (4) Have bridge plans available.
 - (5) Establish a Bureau contact for communication from Response site.
 - (6) Select at least one other structure person to go to the bridge site.
- D. Observe all safety rules at bridge site.
- E. Continue to communicate with all Bureau staff.
 - (1) Notify Bureau Contact Person to perform required communication.
- F. Document actions taken and file for future reference. Communicate to all indicated in Item B.

(4) Public Communication Record

A "Public Communication Record: (PCR) is a form filled out by DOT employees to inform upper management and other potentially interested staff of a contact that may be of interest to the recipient. The contact is normally from the Media, Legislator, Local Official or the public concerning a topic that is or could be controversial now or in the future.

| Within the Bureau of Structures (BOS) the Bureau Director, Section Managers, Supervisors and Lead workers along with the normal default list of PCR contacts should be included in all PCR's filled out by BOS staff.

| A copy of the base PCR form can be found by keying the following link into DOTNET:

| <\\Mad00fp8\N2Public\BMS\FORMS\DT33.doc>

| If you are contacted by the Media, Legislator or Local Official and are not sure if you need to fill out a PCR, contact your Supervisor for their opinion. A PCR is quick and easy to do so "if in doubt fill it out" is the best approach to use.

2.3 RESPONSIBILITIES OF BUREAU OF STRUCTURES

(1) Structures Design Section

- Provide guidance to Regional Offices on the preparation of various types of Structure Survey Reports and hydraulic studies. Evaluate bridge and box culvert Structure Survey Reports and review Regional Office hydraulic studies for compliance to current Standards.
- Assist Regional Offices making design investigation studies by providing guidance on structure costs, depths, and practical structure types for the alternate sites under construction.
- Prepare comparative cost estimates for alternate structure types. Prepare economic studies on rehabilitation versus replacement of existing structure. Make recommendations to Regional Office or Consultant or Government Agency.
- Review and approve Consultant preliminary and final plans, evaluate hydraulic adequacy and compliance to current Standards.
- Review and approve Consultant rehabilitation proposals.
- Collect and make information available to Regional Offices for hydrology studies and new hydraulic developments by other agencies.
- Provide procedures for scour analysis of structures.
- Make field observations of the proposed site, gather additional information for hydraulic reports, and evaluate the general conditions of the site. Coordinate hydraulic impacts with DNR.
- Assemble data and prepare drawings as required by Coast Guard for permit applications to construct bridges over navigable streams. Assemble data as necessary and receive certification from the Corps of Engineers and other agencies exercising environmental control over the proposed structure improvement.
- Prepare preliminary structures plans for bridges. This includes designing, detailing, drafting, estimating, and checking as may be necessary to obtain approvals from other governmental agencies.
- Determine size and length of box culverts. Design and plot culvert plans for checking by staff.

- Distribute preliminary structure plans to Regional Offices for approval and utility contacts.
- Prepare final contract plans for bridges, box culverts and other structures which includes designing, detailing, drafting, estimating and checking in compliance with preliminary study report and Standard Specifications.
- Prepare Special Provisions for construction of bridges, box culverts, and other structures covering special items not on the contract plans or in Standard Specifications. This includes consultant plans.
- Review and approve permits relating to placement of utilities on structures.
- Evaluate bridges for rehabilitation, replacement or widening and recommend the course of action. Prepare contract plans for structure rehabilitation.
- Provide design and plans for bridge damage repair, contract change orders and steel repair.
- Provide technical assistance to Regional Offices or consultants to inquiries on final plans, specifications, materials, etc.
- Upon request review construction falsework plans for structures.
- Design and prepare plans for sign bridges, sign supports, light poles, and other sign or lighting related to structures.
- Review fabrication drawings for monotube, highmast light towers, misc. light and sign support structures as submitted by Bureau of Highway Operations (Traffic Engineering Section) or Regional Office Traffic personnel.
- Make recommendations for standard bridge details, design procedures, and new computer programs to the Structures Development Section.
- Provide design costs for structures on an as needed basis to the Regional Offices for use in negotiating consultant contracts and budgeting in-house design time on structural projects.

(2) Structures Development Section

- Create and maintain plan insert sheets that detail commonly used bridge components (i.e. Parapets, Railings, Bearings, Girders and Diaphragms).
- Review and approve overweight vehicle permit requests for State Trunk Network System bridges. Develop, maintain and distribute a Bridge Log showing structure clearances and load capacities.
- Maintain the filing system and supervise the scanning of all highway structures data.
- Maintain the Highway Structures Information System (HSIS) for transportation structures.
- Develop and maintain Bridge Management Systems.
- Evaluate, implement, and develop new transportation structures Computer Programs and maintain all computer program documentation.
- Respond to transportation structure inquiries and problems. Perform investigation, analyze data, make recommendations, and provide report.
- Provide technical assistance and operational procedures for Bridge Engineering Workstations, CADDs and PC applications.
- Research, evaluate, and recommend the use of new materials, design theories, and structural types. Work closely with other transportation structure agencies and manufacturers in these areas gathering relevant facts and make recommendations for improving materials or product specifications.
- Develop and maintain text and tables for the Bridge Manual and distribute to Staff, Consultants and other public agencies.
- Develop and maintain Bridge Standard details by evaluating new design and/or by revising existing procedures, materials, and specifications. Prepare design tables, graphs, or curves to assist in structures design and detail plans preparation.
- Provide structure related technical assistance to Consultants, Contractors, Counties, DOT Central Offices, and Regional Offices with an emphasis on quality improvement of materials and/or procedures.

- Initiate work plans and provide specifications for Experimental Construction Projects. Provide follow up in-service inspection and performance evaluation reporting on new materials or methods.
- Maintain the Bridge Computer Manual keeping all existing Computer Programs current as they relate to analysis and design procedures, materials, and specifications. Provide computer input forms, process completed forms through the computer, and return computer output to the user for all Bridge Computer Programs.
- Maintain office facilities for data processing and control, computer program documentation, manual texts and technical libraries for design, research records and new products information.
- Provide technical development, guidance, or review of material specifications such as AASHTO, ACI, ASTM, AWS, etc. in areas related to transportation structures.

(3) Structures Maintenance Section

- Perform complex in-depth inspection of structures.
- Write in-depth inspection reports.
- Perform complex emergency repairs.
- Perform routine inspections with or without special equipment.
- Assist in bridge repair.
- Provide bridge inspection training courses.
- Manage the bridge painting program.

2.4 BRIDGE STANDARDS AND INSERT SHEETS

Bridge standards are drawings which show the standard practice for details used by WisDOT. These Standards have been developed over time by input from individuals involved in design, construction and maintenance. They are applicable to most structures and should be used unless exceptions are approved by the Section Managers.

The Insert Sheets represent the Standards and are prepared for insertion in the final set of plans for construction purposes.

The following process should be followed for any modification to the Bridge Standards. Managers, Supervisors, and personnel of the Structures Design Section do not support the use of details created outside this process.

NEW BRIDGE STANDARDS AND MODIFICATIONS PROCESS

Determine which of two classifications with distinct processes that will be used:

1. Minor Changes, or No Content Change

Determine if there is no content change to the standard. Examples of this include moving notes, changing scales, fixing typing mistakes, etc. or if the change is so minute like a correction or a bar size change. Make these changes and an email will be sent to each of the represented units to give a notification about the changes. There will be no formal review process.

2. New Standard and Major Standard Changes

Requestor	-	Submit proposal to Structures Development Section for new or modified Standard.
Structures Development Section	-	Review proposal. Create New Standard or modify existing Standard as requested. Send copies of proposal to Structures Design & Maintenance Managers and Structures Design Unit Supervisors, FHWA and suppliers (if necessary). Establish a timetable that is reasonable and firm for processing the Request.
Structures Design Units	-	Each Unit has two weeks to review proposal and return one copy of Unit comments to Section Manager. Each Unit needs to reach consensus on one set of comments and solicit comments from all experts in their Units.

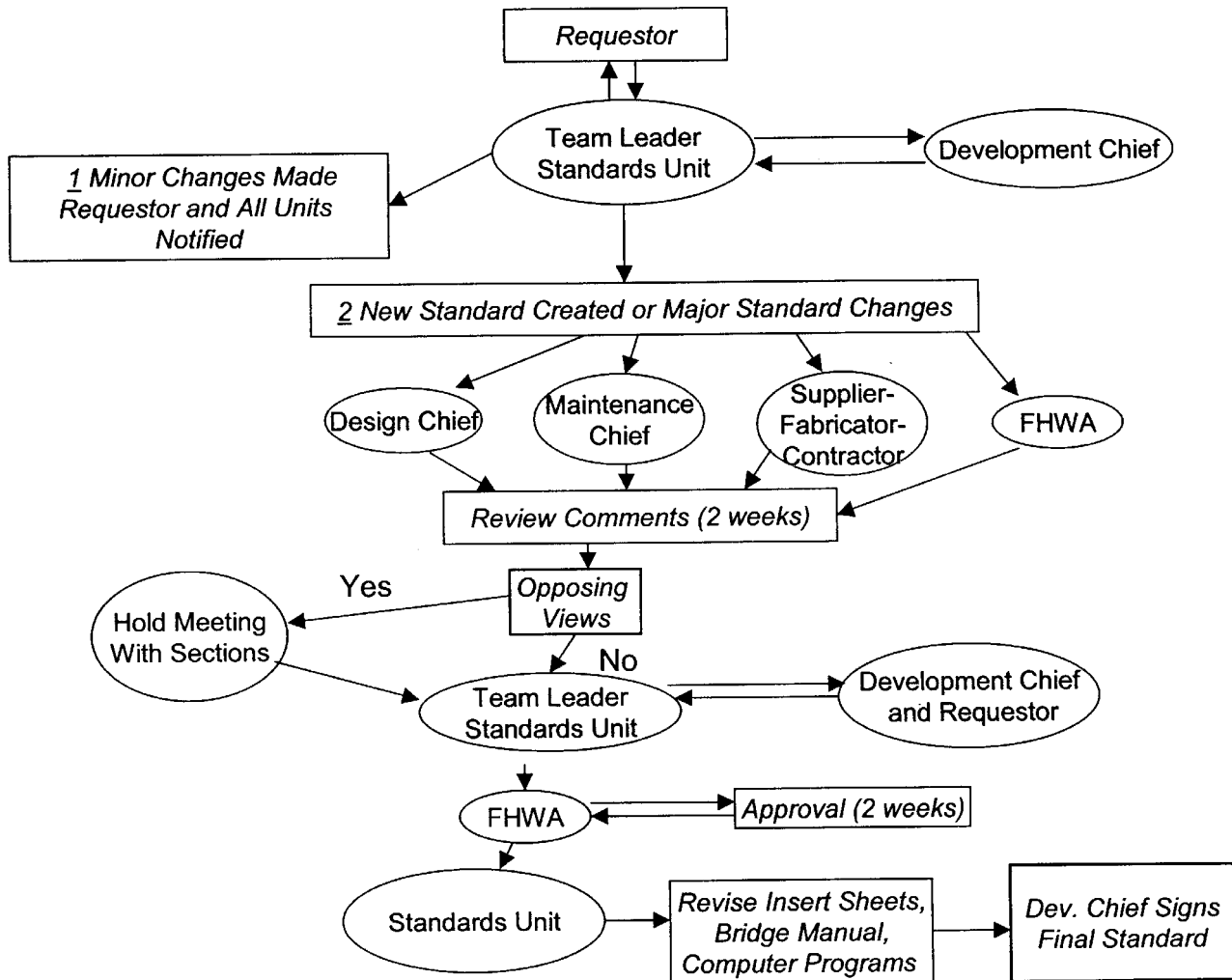
- | | | |
|---------------------------------------|---|---|
| Structures Design Mgr. | - | Review proposal in one week and return one set of comments to Structures Development Section. |
| Structures Development Standards Unit | - | Review comments in two weeks, make changes and submit to Structures Development Manager for approval. Hold meeting with Sections if there are opposing views. |
| Structures Development Manager | - | Review proposal and comments. Either approve or return to Standards Unit with comments for further review. |
| Structures Development Standards Unit | - | Send approved Standard to FHWA. Create new Insert Sheet or modify current Insert Sheet as required. Submit to Structures Design Units for review. |
| | | Finalize Insert Sheet and Bridge Manual by working with Structures Design Units. Keep copy of documented changes on file for one year. |

3. FHWA Approval of Structure Standards Process

The following points define the working relationship between FHWA and WISDOT concerning production and adoption of Bureau of Structures (BOS) Standard Detail Drawings. These points were agreed upon at a meeting on December 17, 2002 between BOS and FHWA.

1. Submittals will be sent by electronic methods in PDF format to FHWA. (For special cases with a large amount of supporting information other methods may be used as agreed to by both parties on a case by case basis).
2. Generally two weeks should be sufficient to render an approval or request for additional information. (In special cases requiring input from sources outside of the Wisconsin FHWA office additional time will be requested in writing with an expected due date for a decision agreed to by both WisDOT and FHWA).
3. Appropriate supporting documentation ranging from written explanations to a fully detailed engineering calculations will accompany submittals. The level of support should reflect the level of review expected.
4. The Structure Standards reviewed by the FHWA will be done so with respect to Federal Law, Policy and safety issues. Differing opinions on other issues will not be cause for non-approval of standards.

New Standard And Standard Modification Process

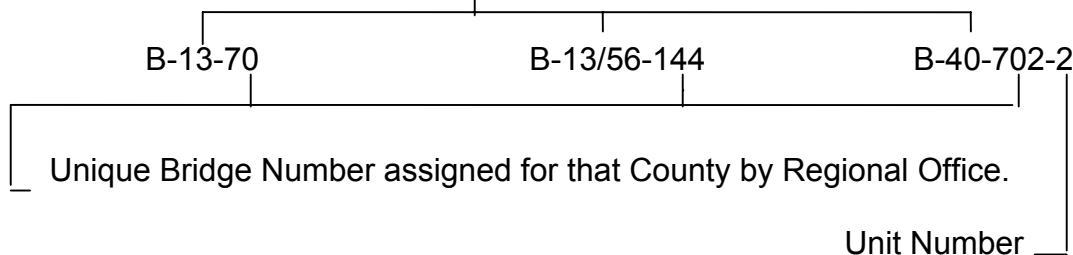


2.5 BRIDGE NUMBERS

An official number referred to as the Bridge Number is assigned to every structure on the State Highway System for the purpose of having a definite designation. The Bridge Number is hyphenated with the first digit being either a B, C, P, S, R, M or N. B is assigned to all structures over 20 ft. (6.1 m) in length, including culverts. C is assigned to all structures 20 ft. (6.1 m) or less in length but must have an area under it greater than 25 square feet. Do not include pipes that do not require structural computations. P designates structures for which there are no structural plans on file (No new P numbers should be assigned as we should always request plans). S is for sign structures, R is for Retaining Walls, and N is for noise barriers. M is for miscellaneous structures where it is desirable to have a plan record. Bridges on state boundary lines also have a number designated by the adjacent state.

Regional Offices should assign numbers to structures before submitting information to the Bureau of Structures for the structural design process or the plan review process. Unit numbers are only assigned to long bridges or complex interchanges where it is desirable to have only one bridge number for the site.

Numeric code for the County where the bridge is located. Two numbers with a slash represent a County Line Bridge. Leading zeros are not shown.



A set of nested pipes may be given a Bridge Number if the distance between the outside walls of the end pipes exceeds 20 ft. (6.1m) and the clear distance between pipe openings is less than half the diameter of the smallest pipe.

Retaining Walls over 5.5' (1700 mm) high (top of footing to top of wall) should be assigned an R number and get a name plate. A Structure Survey Report should be sent to the Structures Design Section, even if designed by the Regional Office.

When a structure is rehabilitated, the name plate should be preserved, if possible, and reinstalled on the rehabilitated Structure. If a new name plate is required, it should show the year of original construction. The original structure number applies to all rehabilitation including widening, lengthening, superstructure replacement, etc.

Pedestrian only bridges get a B number if they are state maintained or cross a roadway. Otherwise use an M number for tracking purposes such as DNR bridges reviewed by DOT.

2.6 BRIDGE FILES

Records and information useful in bridge planning and design are kept in appropriate places. Following is a brief summary of the various types of files, their contents and location. The data is arranged in alphabetical order for quick reference.

	<u>Location</u>	<u>Agency</u>
Bid summary and Analysis Filed according to letting date in notebooks	Structures Design	Str. Bureau
Bridge Books, Final Construction Reports Final Construction records of all bridges on the State Highway System.	_____	Regional Office
Bridge Cost Analysis	Structures Design	Str. Bureau
Bridge List and Log of State Highways Information coded for the electronic computer.	Structures Development	Str. Bureau
Catalogues Manufacturers Product Files, Research Files and Technical Items Civil, Mechanical, and Electrical Technical Reference Books	Structures Development	Str. Bureau
Correspondence	Central Office Files	DOT
Design Calculations After project is completed, the design calculations are filed in a folder until they are digitized.	Bridge Files, Microfilm or in HSIS	Str. Bureau
Engineers Estimates	_____	Proj. Dev. Bureau
FHWA Program Manual	_____	Str. Bureau
Historical File	Structures Development	Str. Bureau

	<u>Location</u>	<u>Agency</u>
Log of Test Borings Records of all borings. Borings for each bridge are kept in Bridge Folder or on microfilm.	Geotechnical Section	Tech Services Bureau
Manuals Bridge Manual, Computer, Construction and Materials Manual, Design Manual, Maintenance Manual, other State's Bridge Manuals, Transportation Administrative Manual	Structures Development	Str. Bureau
Maps Geological Maps, National Forests, Navigation Charts, Rivers - Harbors, State Park, Topographic, Historical	Structures Design	Str. Bureau
Maps City-Village-Town (CVT) Maps showing location of bridges.	Structures Development	Str. Bureau
Payment estimates to Contractors	_____	Proj. Dev. Bureau
Periodicals on Various Technical Subjects Miscellaneous Publications (Current copies only) ACI Journals, ASCE Journals Transportation Research Board, Civil Engineering, Engineering News-Record, Public Roads, Western Builder, Others Available.	Structures Development	Str. Bureau
ASTM Specifications	Structures Development	Str. Bureau
Personnel Files	Admin.	Admin. Services
Photographs Completed Structures	_____	Str. Bureau

	<u>Location</u>	<u>Agency</u>
Microfilm Viewer and Film of Plans Rolls of 35 mm film. Filed by Bridge Number. Refer to HSIS Structure Inventory File for number of film roll.	_____	Str. Bureau
Plans As built All plans are digitized	_____	Str. Bureau
Bridge Plans Plans of structures designed but not yet advertised are in files.	_____	Str. Bureau
Shop Plans of Active Steel Projects	Metals Fabrication & Inspection Unit	Str. Bureau
Standard Insert Sheets	Structures Development	Str. Bureau
Public Utility Copies of prints and agreements are kept here until construction is completed.	_____	Str. Bureau
Quantity Calculations Are kept in design folder until contract is closed.	_____	Str. Bureau
Records (Accounting)	Admin.	Admin. Services
Bridge Standards Documentation for Standards and Bridge Manual	Structures Development	Str. Bureau
Rainfall and Runoff Data	Structures Design	Str. Bureau
Bids on Individual Items	_____	Proj. Dev. Bureau

	<u>Location</u>	<u>Agency</u>
Reports		
Bridge Maintenance Reports	Structures Maintenance	Str. Bureau
Federal Highway Experimental Project Reports	Structures Development	Str. Bureau
Foundation Reports	Geotechnical Section	Tech. Services Bureau
Preliminary Reports Contains Information necessary for Design of Structures.	_____	Regional Office
Research Reports	Structures Development	Str. Bureau
Special Provisions of Active Projects	_____	Str. Bureau
Specifications AASHTO, ACI, AWS, AREMA, AISC, CRSI, PTI, SSPC, etc.	Structures Development	Str. Bureau
Survey Notes	_____	Regional Office
Text Books on Foundations, Structures and Bridge Design	Structures Development	Str. Bureau

2.7 CONTRACTS

| Contracts are administered by construction personnel in the Regional Office where the project is located. The Bureau of Project Development coordinates the activities of the Regional Offices.

| The contract contains the plans, specifications, supplemental specifications where applicable and special provisions where applicable. These parts of the contract are intended to be cooperative. In the event of a discrepancy, the Standard Specifications gives the priority part to be used.

2.8 SPECIAL PROVISIONS

| Special provisions are prepared by the Structures Design Section for each project, as they are only applicable for the one project for which they are written. Following are some of the principal functions of the special provisions:

- (1) Supplement the Standard Specifications by setting forth requirements which are not adequately covered, for the proposed project, by the Standard Specifications.
- (2) Alter the requirements of the Standard Specifications where such requirements are not appropriate for the proposed work.
- (3) Supplement the plans with verbal requirements where such requirements are too lengthy to be shown on the plans.
- (4) Call the bidder's attention to any unusual conditions, regulations or laws affecting the work.
- (5) For experimental use of a new material or system such as paint systems not covered in the Standard Specifications.

When preparing the special provisions for any project, the writer must visualize the project from the standpoint of the problems that may occur during construction.

2.9 TERMINOLOGY

AASHTO	- American Association of State Highway and Transportation Officials.
ABUTMENT	- Supports at the end of the bridge used to retain the approach embankment and carry the vertical and horizontal loads from the superstructure.
ACI	- American Concrete Institute.
AISC	- American Institute of Steel Construction.
ALLOWABLE HEADWATER	- The maximum elevation to which water may be ponded upstream of a culvert or structure as specified by law or design.
ANCHOR BOLTS	- Bolts that are embedded in concrete which are used to attach an object to the concrete such as rail posts, bearings, etc.
ANSI	- American National Standards Institute.
APRON	- The paved area between wingwalls at the end of a culvert.
ASTM	- American Society for Testing Materials.
AVERAGE DAILY TRAFFIC (ADT)	- The average 24-hour volume of traffic, being the total during a stated period divided by the number of days in that period. Unless otherwise stated, the period is a year.
AWARD	- The decision to accept the proposal of the lowest responsible bidder for the specified work, subject to the execution and approval of a satisfactory contract bond and other conditions as may be specified or required by law.
AWS	- American Welding Society.
BACKFILL	- Fill on materials placed between structural elements and existing embankment.
BACKWATER	- An unnaturally high stage in a stream caused by obstruction of flow, as by a dam, a levee, or a bridge opening. Its measure is the excess of unnatural over natural stage. A back up of water due to a restriction.

BAR CHAIR	- A device used to support horizontal reinforcing bars above the base of the form before the concrete is poured.
BAR CUTTING DIAGRAM	- A diagram used in the detailing of bar steel reinforcement where the bar lengths vary as a straight line.
BASE COURSE	- The layer of specified material of designed thickness placed on a subbase or a subgrade to support a surface course.
BATTER PILE	- A pile that is purposely driven at an angle with vertical.
BEARINGS	- Device to transfer girder reactions without overstressing the supports, insuring the bridge functions as intended. (See Fixed Bearings and Expansion Bearings).
BEARING STIFFENER	- A stiffener used at points of support on a steel beam to transmit the load from the top of the beam to the support point.
BEDROCK	- The solid rock underlying soils or other superficial formation.
BENCH MARK	- A relatively permanent material object bearing a marked point whose elevation above or below an adopted datum is known.
BLOCKING DIAGRAM	- A diagram which shows the distance from a horizontal line to all significant points on a girder as it will be during erection.
BRIDGE	- A structure having a span of more than 20 ft. (6.1 meters) from face to face of abutments or end bents, measured along the roadway centerline.
BRIDGE APPROACH	- Includes the embankment materials and surface pavements that provide the transition between bridges and roadways.
BUSHINGS	- A lining used to reduce friction and/or insulate mating surfaces usually on steel hanger plate bearings.
BUTT SPLICE	- A splice where the ends of two adjoining pieces of metal in the same plane are fastened together by welding.
CADDs	- Computer Aided Design and Drafting System.
CAISSON	- A watertight box of wood or steel sheeting; or a cylinder of steel and concrete, used for the purpose of making an excavation.

	Caissons may be either open (open to free air) or pneumatic (under compressed air).
CAMBER	- A slight vertical curvature built into a structural member, to allow for deflection and/or vertical grade.
CATHODIC PROTECTION	- Is a method of protecting steel in concrete by impressing direct current via anodes thus making the bar steel cathodically protected.
CAUSEWAY	- A raised road across wet or marshy ground or across water.
CHANGE ORDER	- A written order to the Contractor, signed by the Engineer, ordering a change in the work from that originally shown by the Plans and Specifications that has been found necessary. If the work is of a nature involving an adjustment or unit price, a Supplemental Agreement shall be executed. Change orders duly signed and executed by the Contractor constitute authorized modifications of the Contract.
CITY	- A district containing a population of 1500 or more, or a village where the resident population exceeds 1000, established in accordance with Wisconsin Statutes.
CITY AND VILLAGE STREETS	- City and Village streets are the public thoroughfares within the boundaries of incorporated municipalities. They are improved and maintained under the jurisdiction of the respective city and village authorities that constitute the local governing bodies. A few city and village streets are eligible for federal aid.
COFFERDAM	- A barrier built in the water so as to form an enclosure from which the water is pumped to permit free access to the area within.
COMPOSITE SECTION	- Two sections made of the same or different materials together to act as one integral section; such as a concrete slab on a steel or prestressed girder.
COMPRESSION SEALS	- A preformed, compartmented, elastomeric (neoprene) device, which is capable of constantly maintaining a compressive force against the joint interfaces in which it is inserted.

CONCRETE OVERLAY	-	1 1/2" to 2" (40 to 50 mm) of concrete placed on top of the deck, used to extend the life of the deck and provide a good riding surface.
CONNECTING STREET	-	The portions of streets or highways in cities and villages with a population of 2500 or more that are excluded as State Trunk Highways marked as such are designated as connecting streets.
CONSTRUCTION LIMITS	-	The point on a state trunk highway where the classification changes from State Trunk Highway System to connecting street, at or inside the corporate limits of a city or village over 2500 population.
CONTRACT	-	The written agreement covering the performance of the work, the furnishing of labor and materials and fulfilling other obligations, by which the contractor is bound and by which the State is obligated to compensate him at the mutually established and accepted rate or price.
CONTRACT TIME	-	The number of calendar days shown in the proposal which is allowed for completion of the work.
CONTRACTION JOINT	-	A joint in concrete that does not provide for expansion but allows for contraction or shrinkage by the opening up of a crack or joint.
CONTRACTOR'S PREQUALIFICATION	-	The classification and rating based on the Experience Questionnaire and Financial Statement filed by the Contractor. A satisfactory rating must be established before a bid may be accepted from a contractor, and it provides dollar limitation on his capacity for work.
COORDINATES	-	Linear or angular dimensions designating the position of a point in relation to a given reference frame. In Wisconsin it refers to the State Plane Coordinate System.
COUNTY TRUNK HIGHWAY SYSTEM	-	The County Trunk Highway System, established in 1925, which forms the secondary system of highways within the State, constitutes the interconnecting highways of the State Trunk System, and is made up mainly of highways secondary in traffic importance. It consists generally of highways of local service and is improved and maintained by the 72 county boards, which

	constitute the local governing authorities. Many county trunks are eligible for federal aid.
CREEP	- Time dependent inelastic deformation under elastic loading of concrete or steel resulting solely from the presence of stress.
CROSS BRACING	- Bracing used between stringers and girders to hold them in place and stiffen the structure.
CULVERT	- "A structure not classified as a bridge having a span of 20 ft. (6.1 meters) or less spanning a watercourse or other opening on a public highway"; a <u>conduit</u> to convey water through an embankment. It is a "grade separation" for the water and the traffic above it.
CURB	- A vertical or sloping member along the edge of a pavement or shoulder forming part of a gutter, strengthening or protecting the edge, and clearly defining the edge of vehicle operators. The surface of the curb facing the general direction of the pavement is called the "face".
CUT-OFF-WALL	- A wall built at the end of a culvert apron to prevent the undermining of the apron.
DEAD LOAD	- Structure dead load including future wearing surface on deck.
DEADMAN	- A concrete mass, buried in the earth behind a structure, that is used as an anchor for a rod or cable to resist horizontal forces that act on the structure.
DECK STRUCTURE	- A structure that has its floor resting on top of all the main stress carrying members.
DEFLECTION JOINT	- A joint placed in the parapets of bridges to prevent cracking of the parapet due to deflection of the superstructures.
DESIGN VOLUME	- A volume determined for use in design representing traffic expected to use the highway. Unless otherwise stated, it is an hourly volume.
DHV	- Design hourly volume.

DIAPHRAGM	- Structural: A structural member used to tie adjoining girders together and stiffen them in a lateral direction as well as distribute loads.
DOLPHINS	- Consist of a group of piles or sheet piling driven adjacent to a pier. Their purpose is to prevent extensive damage or possible collapse of a pier from a collision with a ship or barge.
DRAPED STRANDS	- Strand pattern for prestressing strands, where strands are draped at the ends of the girder to decrease the prestressing stress where the applied moments are small.
DRIFT PIN	- A metal pin, tapered at both ends, used to draw members of a steel structure together by being driven through the corresponding bolt holes.
DRIP GROOVE	- A groove formed into the underside of a projecting sill or coping to prevent water from following around the projection and reaching the face of the wall.
DUMMY JOINT	- A groove in the surface of a concrete structure that resembles a joint but does not go all the way through. It provides a plane of weakness, and is used to ensure that any cracks that occur will be in a straight line.
EPOXY COATED REBAR	- Refers to bar steel reinforcement coated with a powdered epoxy resin, to prevent corrosion of the bar steel.
EXPANSION BEARINGS	- Bearings that allow longitudinal movement of the superstructure relative to the substructure and rotation of the superstructure relative to the substructure.
EXPANSION DEVICE	- A device placed at expansion points in bridge superstructures to carry the vertical bridge loads without preventing longitudinal movement.
EXPANSION JOINT	- A keyed joint in concrete that allows expansion due to temperature changes, thereby preventing damage to the slabs.
FILLER PLATE	- A steel plate or shim used to filling in space between compression members.
FIXED BEARINGS	- Bearings that do not provide for any longitudinal movement of

	-	the superstructure relative to the substructure, but allows for rotation of the superstructure relative to the substructure.
FLAT SLAB	-	A reinforced concrete superstructure that has a uniform depth throughout.
FLOOR BEAM	-	A transverse structural member that extends from truss to truss or from girder to girder across the bridge.
FRACTURE CRITICAL MEMBERS	-	Members of a bridge where a single fracture in a member can lead to collapse.
FRACTURE MECHANICS	-	Study of crack growth in materials.
GVW	-	Gross vehicle weight which is the total weight of basic truck, body and related payload.
GEOTEXTILES	-	Are sheets of woven or nonwoven synthetic polymers or nylon used for drainage and soil stabilization.
GIRDER	-	Main longitudinal load carrying member in a structure.
GRADE SEPARATION	-	A crossing of two highways, or a highway and a railroad, at different levels.
GRID FLOORS	-	Are prefabricated steel grids set on girders and/or stringers provide the roadway surface, generally on moveable highway structures.
GRILLAGE	-	Horizontal members, usually of steel, for spreading the load of a structure over its footing or underpinning.
HAMMERHEAD PIER	-	A pier which has only one column with a cantilever cap and is somewhat similar to the shape of a hammer.
HANGER PLATE	-	A steel plate which connects the pins at hinge points thus transmitting the load through the hinge.
HAUNCH	-	An increase in depth of a structural member usually at points of intermediate support.

HAUNCHED SLAB	- A reinforced concrete superstructure that is haunched (has an increased depth) at the intermediate supports.
HINGE	- A device used to hold the ends of two adjoining girders together, but allowing for longitudinal movement of the superstructure.
HINGED BEARING	- At hinge location along a girder, where forces from supported member are transferred to supporting member by a bearing (See Std. 24.8).
HOLDDOWN DEVICE	- A device used on bridge abutments to prevent girders from lifting off their bearings as a result of the passage of liveload over the bridge.
HYBRID GIRDER	- A steel plate girder with the web steel having a lower yield strength than the steel in one or both flanges.
INLET CONTROL	- The case where the discharge capacity of a culvert is controlled at the culvert entrance by the depth of headwater and the entrance geometry, including barrel shape, cross sectional area, and inlet edge.
INTERMEDIATE STIFFENER	- A vertical transverse steel member used to stiffen the webs of plate girders between points of supports.
JETTING	- Forcing water into holes in an embankment to settle or compact the earth.
LAGGED PILE	- A steel H-pile with timber bolted to the web between the flanges for a selected distance at the base of the pile to increase bearing resistance.
LAMINATED ELASTOMERIC BEARING	- A bearing device constructed from elastomer layers restraining at their interfaces by integrally bonded steel or fabric reinforcement. Its purpose is to transmit loads and accommodate movements between a bridge and its supporting structure.
LATERAL BRACING	- Bracing placed in a horizontal plane between steel girders near the bottom and/or top flanges.

LEADS	- The vertical members of a pile driver that steady the hammer and pile during the driving.
LIQUID PENETRANT INSPECTION	- Nondestructive inspection process for testing for continuities that are open to the surface, by using a liquid dye.
LIVELOAD	- For highway structures AASHTO truck or lane loadings.
LRFD	- Load Resistance Factor Design.
LONGITUDINAL STIFFENER	- A longitudinal steel plate (parallel to girder flanges) used to stiffen the webs of welded plate girders.
LOW RELAXATION STRANDS	- Are prestressing tendons which are manufactured by subjecting the strands to heat treatment and tensioning causing a permanent elongation. This increases the strand yield strength and reduces strand relaxation under constant tensile stress.
LOW SLUMP CONCRETE	- Grade "E" concrete, used for concrete masonry overlays and repairs on decks.
MAG PARTICLE INSPECTION	- Nondestructive inspection process for testing for the location of surface cracks or surface discontinuities, by applying dry magnetic particles to a weld area or surface area that has been suitably magnetized.
MODULAR EXP. JOINTS	- Are multiple, watertight units placed on structures requiring expansion movements greater than 4" (100 mm).
MUD SILL	- A timber platform laid on earth as a support for vertical members or bridge falsework.
NCHRP	- National Cooperative Highway Research Program.
NEGATIVE MOMENT	- The moment causing tension in the top fibers and compression in the bottom fibers of a structural member.
NEGATIVE REINFORCEMENT	- Reinforcement placed in concrete to resist negative bending moments.
NON-REDUNDANT STRUCTURE	- Type of structure with single load path, where a single fracture in a member can lead to the collapse of the structure.

OIL WELL PIPE PILE	- High quality pipe used in oil industry drilling operations that may be used as an alternate to HP piling.
OUTLET CONTROL	- The case where the discharge capacity of a culvert is controlled by the elevation of the tailwater in the outlet channel and the slope, roughness, and length of the culvert barrel, in addition to the cross sectional area and inlet geometrics.
P S & E	- Literally plans, specifications, and estimates. Usually it refers to the time when the plans, specifications, and estimates on a project have been completed and referred to FHWA for approval. When the P S & E have been approved, the project goes from the preliminary engineering phase to the construction phase.
PARAPET	- A masonry barrier designed and placed to protect traffic from falling over the edge of a bridge, or in some cases, from crossing lanes of traffic traveling in opposite directions.
PIER	- Intermediate substructure unit of a bridge.
PILE	- A long, slender piece of wood, concrete, or metal to be driven or jetted into the earth or river bed to serve as a support or protection.
PILE BENT	- A pier where the piles are extended to the pier cap to support the structure.
PILE CAP	- A slab, usually of reinforced concrete, covering the tops of a group of piles for the purpose of tying them together and transmitting to them as a group the load of the structure which they are to carry.
PILE FOOT	- The lower extremity of a pile.
PILE HEAD	- The top of a pile.
PILE POINTS	- Metal tip fastened to the lower end of pile to protect it when the driving is hard.
PIN PLATE	- A steel plate attached to the web plate of girders at hinge points to strengthen the web plate of girders at the hinge locations.

PIPE ARCH	- A conduit in the form of a broad arch with a slightly curved integral bottom.
POSITIVE MOMENT	- In a girder the moment causing compression in the top flange and tension in the bottom flange.
POST-TENSIONED	- Method of prestressing in which the tendon is tensioned after the concrete has cured.
PRESTRESS CAMBER	- The deflection in prestressed girders (usually upward) due to the application of the prestressing force.
PRESTRESSED CONCRETE	- Concrete in which there have been introduced internal stresses of such magnitude and distribution that the stresses resulting from given external loadings are counteracted to a desired degree. In reinforced-concrete members the prestress is commonly introduced by tensioning the steel reinforcement.
PRETENSIONED	- Any method of prestressing in which the strands are tensioned before the concrete is placed.
PROPOSAL	- The offer of the bidder, submitted on the prescribed proposal form, to perform the work including the furnishing of labor and materials at the prices quoted by the bidder.
PUMPING	- The ejection of mixtures of water, clay and/or silt along or through transverse or longitudinal joints, crack or pavement edges, due to vertical movements of the slab under traffic.
RADIOGRAPHIC INSPECTION	- Nondestructive inspection process where gamma rays or X rays pass thru the object and cast an image of the internal structure onto a sheet of film as the result of density changes.
REDUNDANT STRUCTURE	- Type of structure with multi-load paths where a single fracture in a member cannot lead to the collapse of the structure.
REFLECTION CRACK	- A crack appearing in a resurface or overlay caused by movement at joints or cracks in underlying base or surface.
RESIDUAL CAMBER	- Camber due to the prestressing force minus the deadload deflection of the girder.

RIPRAP	- A facing of stone used to prevent erosion. It is usually dumped into place, but is occasionally placed by hand.
ROLLED GIRDER STRUCTURE	- A structure which has a rolled steel beam as the main stress carrying member.
ROUGHOMETER	- A wheeled instrument used for testing riding qualities or road surfaces.
S.S.P.C.	- Steel Structures Painting Council.
SEMI-RETAINING ABUTMENT	- An abutment used for retaining part of the back-fill of the roadway as well as supporting the end of the bridge.
SEMI-THROUGH STRUCTURE	- A structure that has no overhead bracing, but the main stress carrying members project above the floor level.
SHEAR CONNECTOR	- A connector used to join cast-in-place concrete to a steel section and to resist the shear at the connection.
SHEET PILE	- A pile made of flat or arched cross section to be driven into the ground or sea bed and meshed or interlocked with like members to form a wall, or bulkhead.
SHOULDERS	- The portions of the roadway between the traveled way and the inside edges of slopes of ditches or fills, exclusive of auxiliary lanes, curbs, and gutters.
SHRINKAGE	- Contraction of concrete due to drying and chemical changes, dependent on time.
SILL ABUTMENT	- A shallow concrete masonry abutment generally about 5 ft. (1.5 meters) deep.
SIMPLE SPANS	- Spans with the main stress carrying members non-continuous, or broken, at the intermediate supports.
SKEW OR SKEW ANGLE	- The acute angle formed by the intersection of a line normal to the centerline of the roadway with a line parallel to the face of the abutments or piers, or in the case of culverts with the centerline of the culverts. Left hand forward skew indicates that, look up station, the left side of the structure is further up

	station than the right hand side. Right hand skew indicates that the right side of structure is further up station than the left side.
SLOPE	- The degree of inclination to the horizontal. Usually expressed as a ratio, such as 1:25 or 1 of 25, indicating 1 unit rise in 25 units of horizontal distance.
SLOPE PAVING	- Paving placed on the slope in front of abutment under a bridge to prevent soil erosion and sliding.
SPANDREL	- The area between the roadway and the arch in the side view of an arch bridge.
SPECIAL PROVISIONS	- Those special directions and requirements, identified as special provisions, that are prepared for the project under consideration and made a part of the contract.
SPECIFICATIONS	- The body of directions, provisions, and requirements contained herein, together with written agreements and all documents of any description, made or to be made, pertaining to the method or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract.
SPREAD FOOTING-	A footing that is supported directly by soil or rock.
SPUR DIKE	- A wall or mound built or extended out from the upstream side of an abutment used to training the stream flow to prevent erosion of stream bank. May also be used where there is no bridge, but the stream flows along the side of highway embankment.
STAINLESS STEEL - TEFLON BEARINGS	Incorporates stainless steel and teflon with steel to provide the necessary expansion movement.
STATE PLANE COORDINATES	- The plane-rectangular coordinate system established by the United States Coast and Geodetic Survey. The plane coordinate system in Wisconsin is based on the Lambert conformal conic projection. Plane coordinates are used to locate geographic position.
STATE TRUNK HIGHWAY NETWORK	- The system of highways heretofore selected and laid out by the Legislature and special legislative committees and by the Commission, and as revised, altered and changed by the

	Commission, including temporary routes designated by the Commission, the portions of the Interstate Highway System within the state, and routes adopted by the American Association of State Highway Officials as part of the U.S. Numbered Route System.
STIRRUP	- Vertical U-shaped or rectangular shaped bars placed in concrete beams to resist the shearing stresses in the beam.
STRIP SEAL JOINT	- Are molded neoprene glands inserted and mechanically locked between armored interfaces of extruded steel sections.
SUBSTRUCTURE	- All of that part of the structure below the bridge seats or below the skewbacks of arches, or below the tops of the caps of piling or framed trestles, except that the wingwalls and parapets of abutments shall be considered as part of the substructure.
SUPERSTRUCTURE	- That part of the structure above the bridge seats, or above the skewbacks of arches, or above the tops of the caps of piling or framed trestles, including the flooring, but excluding wing walls and parapets of abutments (See substructures).
SUPPLEMENTAL SPECIFICATIONS	- Specifications adopted subsequent to the publication of these specifications. They generally involve new construction items or substantial changes in the approved specifications. Supplemental specifications prevail over those published whenever in conflict therewith.
SURCHARGE	- Any load that causes thrust on a retaining wall, other than backfill to the level of the top of the wall.
TRB	- Transportation Research Board.
TEMPORARY HOLDDOWN DEVICE	- A device used at the ends of steel bridges where the slab pour terminates to prevent the girders from lifting off the abutment bridge seats during the pouring of the concrete deck.
TENDON	- A name for prestressed reinforcing element whether wires, bars, or strands.
THROUGH STRUCTURE	- A structure that has its floor connected to the lower portion of the main stress-carrying members, so that the bracing goes over

	- the traffic. A structure whose main supporting members project above the deck or surface.
TINING	- Is used on finished concrete deck or slab surfaces to provide friction and reduce hydroplaning.
TOWN ROAD SYSTEM	- The town road system, or tertiary system of highways within the state, has been improved or maintained under the jurisdiction of the town boards, which are the local governing bodies. Some of the town roads are eligible for federal aid.
TRANSFER STRESSES	- In pretensioned prestressed concrete members the stresses that take place at the release of prestress from the bulkheads.
ULTRASONIC INSPECTION	- A non-destructive inspection process where by an ultra-high frequency sound wave induced into a material is picked up in reflection from any interface or boundary.
UNBONDED STRANDS	- Strands so coated as to prevent their forming a bond with surrounding concrete. Used to reduce stress at the ends of a member.
UNDERPINNING	- The adding of new permanent support to existing foundations, to provide either additional capacity or additional depth.
UPLIFT	- A force tending to raise a structure or part of a structure and usually caused by wind and/or eccentric loads, or the passage of live-load over the structure.
WATERPROOFING MEMBERS	- Are impervious asphaltic sheets overlaid with bituminous concrete to protect decks from the infiltration of chlorides and resulting deterioration.
WEARING SURFACE	- The top layer of a pavement designed to provide structural values and a surface resistant to traffic abrasion.
WEEP HOLE	- A drain hole through a wall to prevent the building up of hydraulic pressure behind the wall.
WEIR	- A dam across a stream for diverting or measuring the flow.
WELD INSPECTION	- Covers the process, written procedure, and welding in process. Post weld heat maintenance if required, post weld visual

inspection and non-destructive testing as specified in contract and Standard Specifications.

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|--------------------|---|
| WELDED WIRE FABRIC | - A two-way reinforcement system, fabricated from cold-drawn steel wire, having parallel longitudinal wires welded at regular intervals to parallel transverse wires and conforming to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement";, AASHTO. |
| WELL-GRADED | - An aggregate possessing proportionate distribution of successive particle sizes. |
| WINGWALL | - A wall attached to the abutments of bridges or box culverts retaining the backfill of the roadway. The sloping retaining walls on each side of the center part of a bridge abutment. |

2.10 BRIDGE OFFICE HISTORY

In 1907, the Wisconsin State Legislature established a Highway Division within the Wisconsin Geological and Natural History Survey. In 1908, the Division opened a separate Bridge Department under the first Bridge Engineer, M. W. Torkelson. The office was located in the basement of the State Capitol. Initially, the Bridge Department played only an advisory role, conducting site surveys, and circulating standardized plans to local officials, private engineers, and bridge companies. In 1911, the legislature established a State Highway System and the former Highway Division was transformed into an autonomous State Highway Commission. M. W. Torkelson remained in charge of the Bridge Department for the next ten years and was cited by a former colleague for his untiring efforts of improving bridge design and construction in Wisconsin.

State Bridge Engineers

1 st	Martin W. Torkelson	1908-1921
2 nd	Walter C. Buetow	1921-1924
3 rd	Charles H. Kirch	1924-1955
4 th	Harold B. Schultz	1955-1966
5 th	William A. Kline	1967-1980
6 th	Stanley W. Woods	1981-2001
7 th	Finn K. Hubbard	2001-

On April 18, 1993, the Bridge Office was merged with the Design Office and the State Bridge Engineer was also the Structures Development Engineer. On September 23, 2001, the Bureau of Structures was created with the Bureau Director becoming the State Bridge Engineer.

Prior to the early 1950's, structure types on Wisconsin State Highways were predominantly reinforced concrete slabs and steel girders or trusses with reinforced concrete decks. Also, timber structures were used at a number of county and town road sites. In 1952, the first prestressed concrete voided slab sections were cast and erected incorporating transverse post-tensioning. In 1956, the first prestressed concrete "I" girders were designed and precast. After field setting, these prestressed girders were post-tensioned and completed with an integral cast-in-place reinforced concrete deck. During the mid 1950's and early 1960's, prestressed concrete "I" and steel girder structures were made continuous and incorporated composite designs for carrying live loads.

In 1971, the first cable-stayed bridge in the United States, a three span pedestrian structure, was constructed in Menomonee Falls. The longest prestressed girder structure is the 2125 meter Mason Street Bridge located in Green Bay and the longest steel girder structure is the 2434 meter Duluth-Superior Interstate Bridge located at Superior. The longest total length structure counting all types and units is Milwaukee's Marquette Interchange bridge at 10,115 meters. The State Trunk Network contains over 4500 structures. The Off System contains over 8500 structures.

Sources: Historic Highway Bridges in Wisconsin, Volume 1 by Robert Newbery, 1986.
Badger Highways 1922-1929, University of Wisconsin Engineering Library.

(1) Unique Structures

<u>STRUCTURE TYPE</u>	<u>BRIDGE NUMBER</u>	<u>YEAR CONSTRUCTED</u>	(meters) <u>SPAN CONFIGURATION</u>
Steel Rigid Frames	B-40-48 - Milwaukee	1959	13.7, 51.2, 14
Steel Rigid Frames	B-56-47/48* - Mirror Lake	1961	15.5, 67.1, 14.9
Overhead Timber Truss	B-22-50* - Cassville	1962	14.6
Arch Truss	B-16-5 - Superior	1961	82.3, 182.9, 82.3
Concrete Box Girder	B-40-285 - Milwaukee	1965+	Varies
Cable Stayed Girder	B-67-137* - Menomonee Falls	1970	21.9, 66.1, 21.9
Steel Box Girders	B-64-86* - East Troy	1971	58.5, 56.7
Steel Box Girders	B-64-87* - East Troy	1971	49.1, 51.2
Tied Arches	B-9-87* - Cornell	1971	147.8
Tied Arches	B-12-27* - Prairie du Chien	1974	140.8
Tied Arches	B-40-400 - Milwaukee	1974	82.3, 182.9, 82.3
Tied Arches	B-5-158* - Green Bay	1980	137.2
Tied Arches	B-22-60 - Dubuque, IA	1982	204.2
Tied Arches	B-16-38* - Superior	1984	152.4
Prestressed "I" Girders with Cantilever	B-40-524* - Milwaukee	1985	34.1, 24.4, 33.5, 33.5 Spans with 7.6 m Cantilevers
Prestressed Strutted Arches	B-40-603 - Milwaukee	1992	8-48.2 m Strutted Arch Spans

* Designed in the Wisconsin Department of Transportation Bridge Office.

(2) Structure Awards

<u>STRUCTURE TYPE</u>	<u>LOCATION</u>	<u>AWARDING AGENCY</u>	<u>AWARD YEAR*</u>
Continuous Steel Girder, 318.5 m Total Length	Little Chute-Kimberly CTH "N"/Fox River B-44-5	AISC	1954
Curved Steel Girder 421.8 m Total Length	College Avenue/Fox River B-44-16, Appleton	AISC	1959
Steel Rigid Frame 51.2 m Span	Cemetery Access over IH 94, Milwaukee B-40-48	AISC	1961
Cable Stayed Girder Pedestrian, 66 m Main Span	Pedestrian/USH 41 & 45 B-67-137, Menomonee Falls	AISC	1971
Steel Tied Arch 140.8 m	USH 18/Mississippi River B-12-27, Prairie du Chien	AISC	1976
1780 mm Prestressed Concrete "I" Girder 40.2 m Span	CTH "BB"/Oconto River B-42-20, Gillett	PCI	1976
1780 mm Prestressed Concrete "I" Girder Approaches 360.3 m Total Length	STH 42 & 57/Sturgeon Bay B-15-4	PCI	1978
Steel Tied Arch 137.2 m Span	IH 43/Fox River, Green Bay B-5-158	WI-ASCE	1981
1780 mm Prestressed Concrete "I" Girder 205.7 m Length	Lincoln Memorial/Milwaukee B-40-524	WSA w/ AIA	1985
1370 mm Prestressed Concrete "I" Girder 59.4 m Length	South Town/Monona B-13-311	PCI	1991

Continuous Steel Girder 725 m Total Length	IH 94/St. Croix River Hudson, B-55-126	FHWA/AASHTO	1997
Haunched Conc. Slabs and Prest. Box Sect. 34 m; 18 m; 24 m	STH 22/Fox R., Montello R., Montello B-39-49; B-39-50; B-39-51	WRMCA	1997
1780 mm Prestressed Concrete I Girder 386 m Length	Johnson Street/STH 23 City of Fond du Lac B-20-46; R-20-7; R-20-8	WRMCA	2001
Steel Tied Arch 145 m	IH 90/Mississippi River B-32-202, LaCrosse	ASCE	2005

* Awards of record on Wisconsin DOT Bridge Office Structures since 1950.

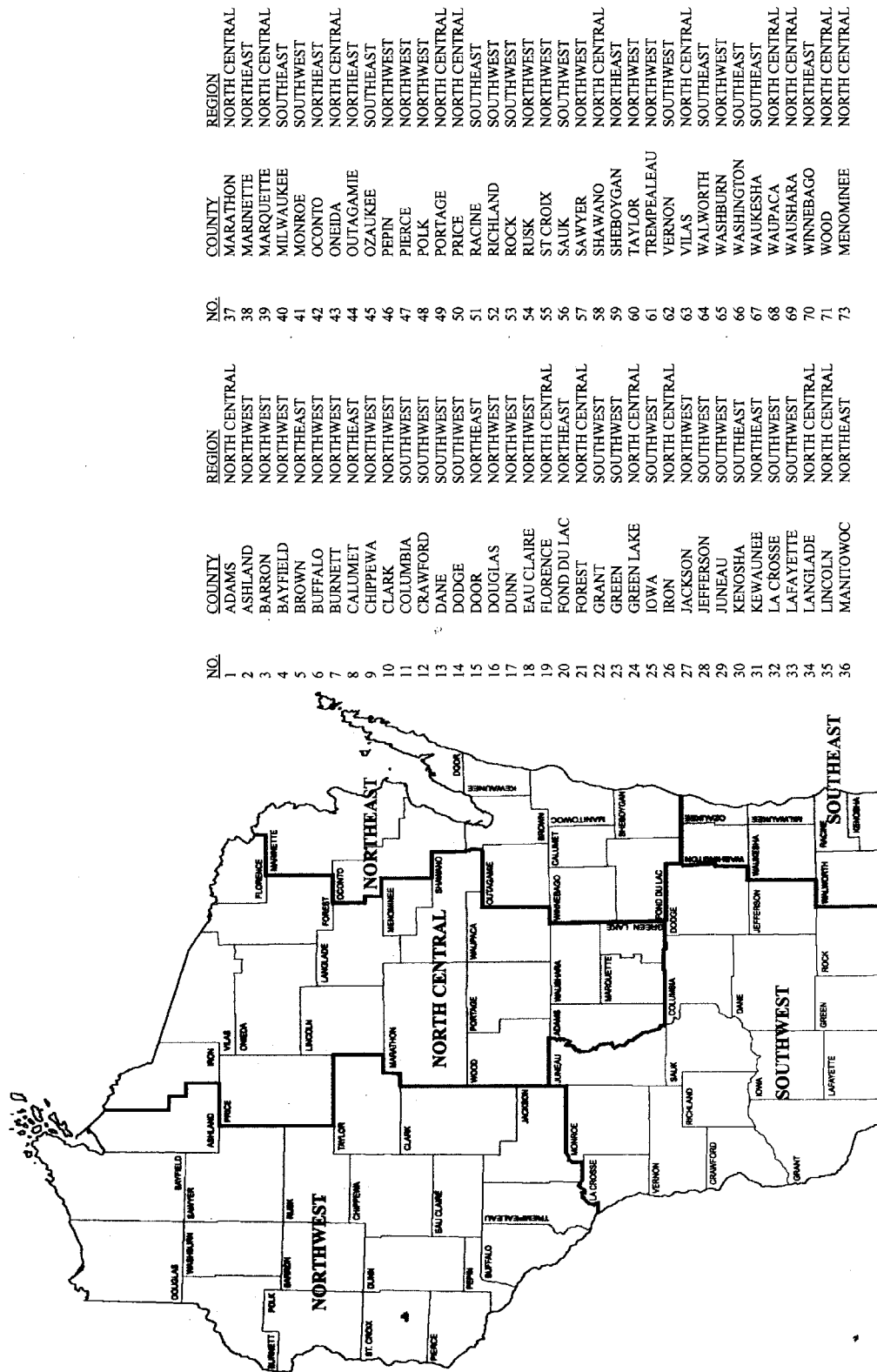


FIGURE 2.3